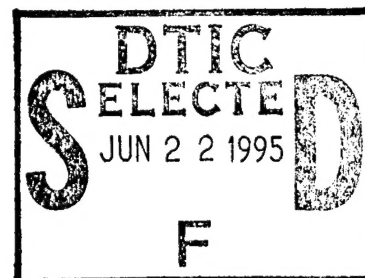


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**FINAL DECISION DOCUMENT
FOR THE INTERIM RESPONSE ACTION
AT THE
LIME SETTLING BASINS
ROCKY MOUNTAIN ARSENAL
MARCH 1990
CONTRACT NO. DAAA15-88-D-0022/0002
VERSION 4.0**

Prepared by:

WOODWARD-CLYDE CONSULTANTS

Prepared for:

PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1-1
2.0 HISTORY OF THE LIME SETTLING BASINS	2-1
3.0 INTERIM RESPONSE ACTION OBJECTIVE	3-1
4.0 INTERIM RESPONSE ACTION ALTERNATIVES	4-1
4.1 NO ACTION	4-1
4.2 MONITORING	4-2
4.3 INSTITUTIONAL CONTROLS	4-2
4.4 SUBSURFACE BARRIER	4-2
4.5 SUBSURFACE BARRIER WITH GROUNDWATER EXTRACTION AND TREATMENT	4-3
4.6 MULTILAYERED CAP	4-4
4.7 EXCAVATION AND ONSITE TEMPORARY STORAGE	4-4
4.8 CONCLUSIONS	4-5
5.0 CHRONOLOGY OF EVENTS	5-1
6.0 SUMMARY OF THE INTERIM RESPONSE ACTION	6-1
6.1 HEALTH & SAFETY PLAN	6-1
7.0 INTERIM RESPONSE ACTION PROCESS	7-1
8.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES - LIME SETTLING BASINS, INTERIM RESPONSE ACTION	8-1
8.1 INTRODUCTION	8-1
8.2 AMBIENT OR CHEMICAL-SPECIFIC ARARS	8-1
8.3 LOCATION-SPECIFIC ARARS	8-1
8.4 ACTION-SPECIFIC ARARS	8-2
8.5 COMPLIANCE WITH THE OTHER ENVIRONMENTAL LAWS	8-8
9.0 SCHEDULE	9-1
10.0 CONSISTENCY WITH THE FINAL REMEDIAL ACTION	10-1
11.0 REFERENCES	11-1
APPENDIX A - COMMENTS AND RESPONSES	

FIGURES

Page

- 1-1 Decision Flow Chart for Other Contamination Sources IRAs
- 2-1 Location Map - Rocky Mountain Arsenal
- 2-2 M-1 Settling Basins and Lime Settling Basins Area Map

1-2
2-2
2-3

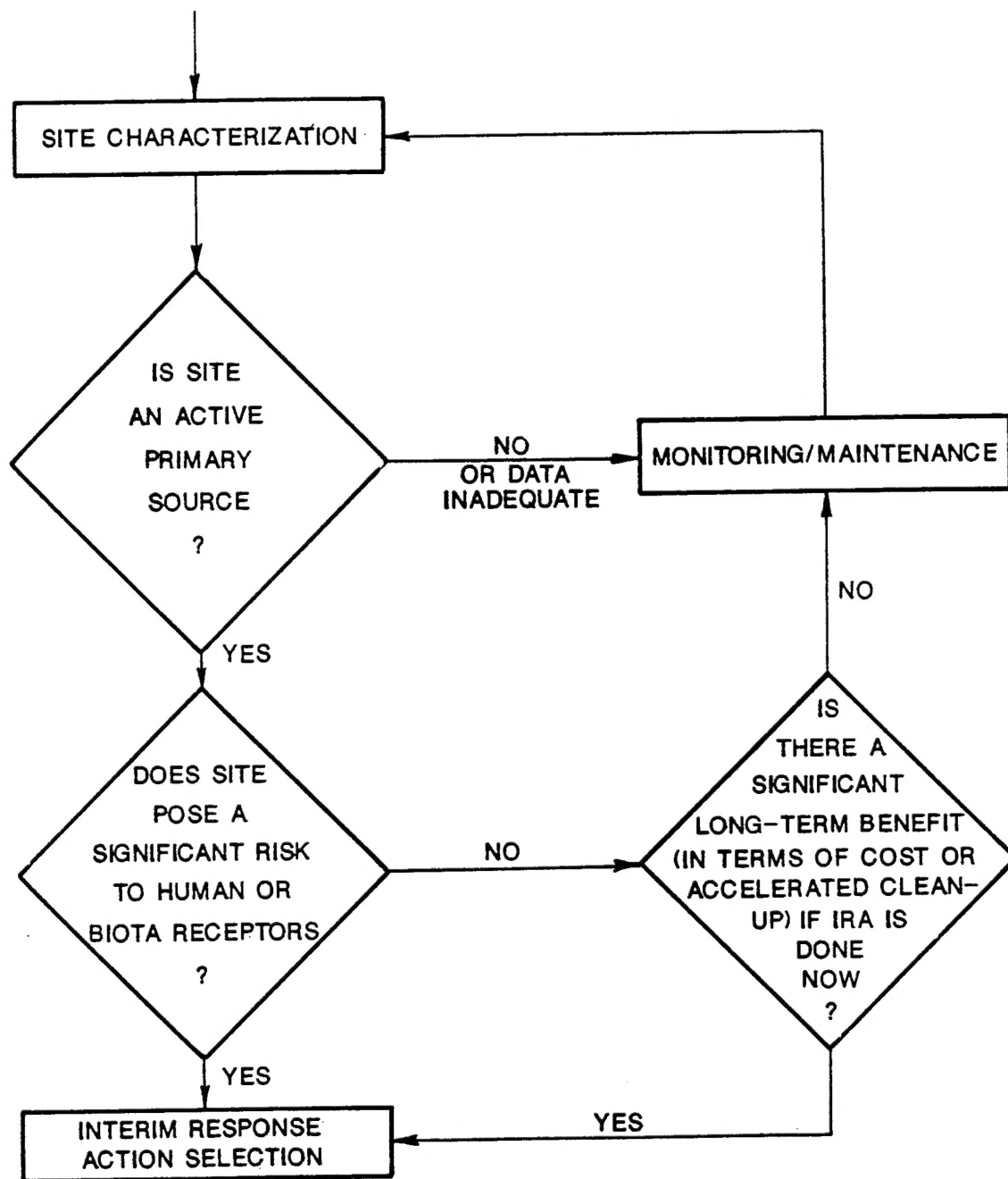
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1.0
INTRODUCTION

The Interim Response Action (IRA) alternative assessment and decision process for the Lime Settling Basins at the Rocky Mountain Arsenal (RMA) is being conducted as part of the IRA process for RMA in accordance with the Federal Facility Agreement and Technical Program Plan.

Determinations concerning the implementation of this IRA have been reached through a consideration of the objectives of Sections 2.3 (a), 22.5, and 22.6 of the Federal Facility Agreement and by application of the Decision Flow Chart for Other Contamination Sources IRAs adopted by the Organizations and the State in the June 7, 1989 subcommittee meeting (Figure 1-1).

Alternatives have been reviewed based on their overall protectiveness of human health and the environment; compliance to the maximum extent practicable with Applicable or Relevant and Appropriate Requirements (ARARs); reduction in mobility, toxicity, or volume; short-term and long-term effectiveness; implementability; and cost-effectiveness. The preferred IRA consists of relocation of sludge material, which had been deposited around the Lime Settling Basins, to the Lime Settling Basins area; construction of a 360-degree subsurface barrier around the basins; construction of a soil and vegetative cover over the material; and installation of a groundwater extraction system.



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Date: 12/18/89

DECISION FLOW CHART FOR OTHER
CONTAMINATION SOURCES IRAs

Figure 1-1

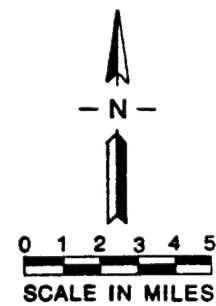
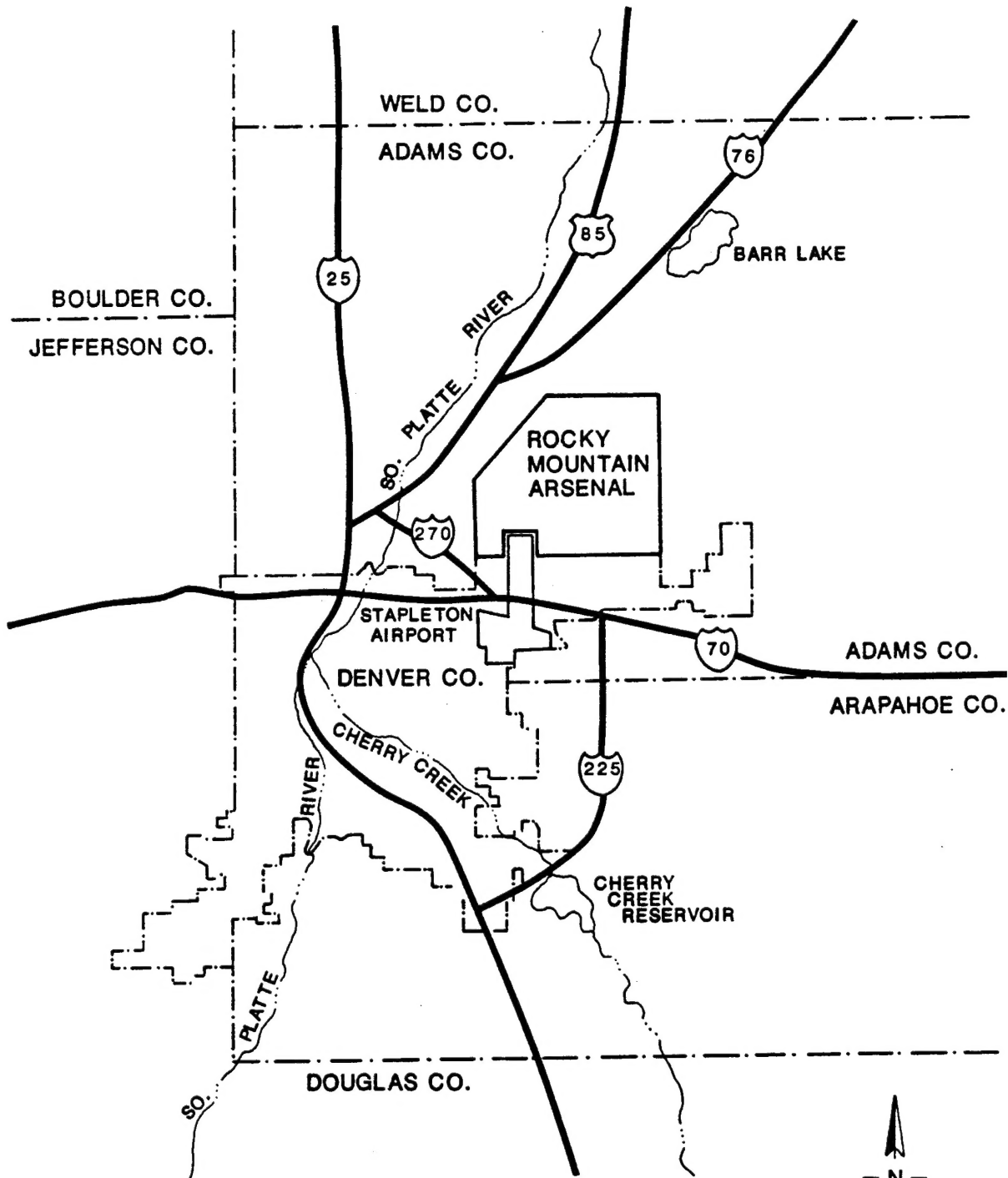


HISTORY OF THE LIME SETTLING BASINS

Rocky Mountain Arsenal (RMA) occupies more than 17,000 acres (approximately 27 square miles) in Adams County, directly northeast of metropolitan Denver, Colorado (Figure 2-1). The property was purchased by the U.S. government in 1942 for use in World War II to manufacture and assemble chemical warfare materials, such as mustard and lewisite, and incendiary munitions. Starting in the 1950s, RMA produced the nerve agent GB (isopropyl methylphosphonofluoridate) until late 1969. A significant amount of chemical warfare materials destruction took place during the 1950s and 1960s. After 1970, RMA was primarily involved with the destruction of chemical warfare materials. The last military operations at RMA ended in the early 1980s. In November 1988, the RMA was reduced to inactive military status reflecting the fact that the only remaining mission at the Arsenal is contamination cleanup. In addition to these military activities, major portions of the plant facilities were leased to private industries, including Shell Oil Company, for the manufacture of various insecticides and herbicides, between 1947 and 1982.

During the 1940s and 1950s, wastewater from the production of Army agents was routinely treated prior to discharge to unlined evaporation ponds. This treatment involved the addition of lime to the wastewater to precipitate metals and reduce the arsenic concentration. Wastewaters produced in the South Plants were channelled through the Lime Settling Basins prior to gravity discharge to Basin A. The precipitation process produced a lime sludge that contained elevated levels of heavy metals, arsenic, and mercury. Subsequent discharges of pesticide production wastewater resulted in the addition of pesticides to the Lime Settling Basins sludge. The Lime Settling Basins were taken out of service in 1957. Figure 2-2 shows the location of the Lime Settling Basins.

A number of studies have been completed to characterize the nature and extent of contamination in the soil, sludge, and groundwater in the vicinity of the Lime Settling Basins (ESE 1987a and 1987b; Ebasco 1989; WCC 1989). Results of these studies are consistent with the site history. The soil and sludge contain elevated levels of organochlorine pesticides, organosulfur compounds, arsenic, mercury, and ICP metals (cadmium, chromium, copper, lead, and zinc). The Lime Settling Basins occupy about 5 acres. For the purpose of the alternatives assessment, it was estimated that approximately 80,000 cubic yards of sludge within the basins, plus approximately 26,000 cubic yards of sludge that had been placed adjacent to the basins for drying, would be addressed by this IRA.



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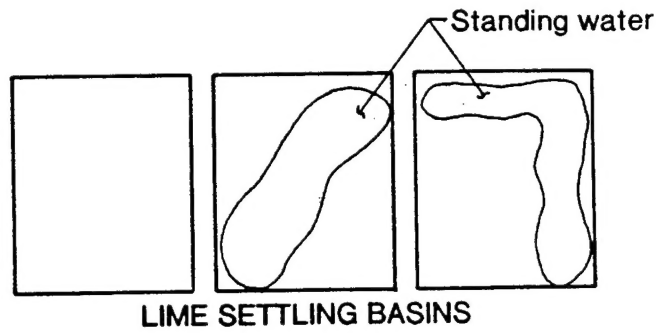
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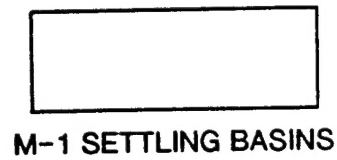
LOCATION MAP RMA

Figure 2-1

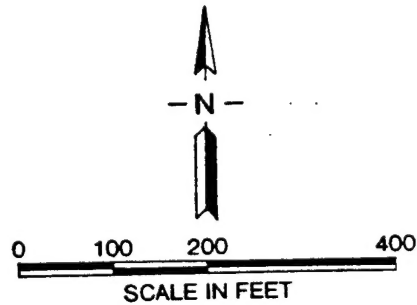
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ROCKY MOUNTAIN ARSENAL
KEY MAP

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Date : 12/18/89

M-1 SETTLING BASINS AND
LIME SETTLING BASINS AREA MAP

Figure 2-2

On February 1, 1988, a proposed Consent Decree was lodged in the case of United States v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The proposed Consent Decree was revised after public comments were received, and a modified proposed Consent Decree was lodged with the Court on June 7, 1988. In February 1989, a Federal Facility Agreement was entered into between five federal agencies: the Environmental Protection Agency, the Army, the Department of the Interior, the Department of Health and Human Services, and the Department of Justice, which established procedures for implementing the Arsenal cleanup program as specified in the Technical Program Plan, and incorporated many provisions of the modified proposed consent decree. The Army and Shell Oil Company agreed to share certain costs of the remediation to be developed and performed under the oversight of the U.S. Environmental Protection Agency, with opportunities for participation by the State of Colorado. The long-term remediation is a complex task that will take several years to complete. The Federal Facility Agreement specifies 13 Interim Response Actions (IRAs) determined to be necessary and appropriate. The "Remediation of Other Contamination Sources" is one of the 13 IRAs. The Lime Settling Basins is one of several sites being addressed by the remediation of other contamination sources IRA. The action at this site consists of assessment and, as necessary, the selection and implementation of an interim action.

3.0

INTERIM RESPONSE ACTION OBJECTIVE

The objective of the Interim Response Action (IRA) Alternatives Assessment for the Lime Settling Basins is to assess whether immediate action at this site is appropriate and to recommend, if necessary, an IRA alternative to mitigate the threat of release from the Lime Settling Basins on an interim basis, pending determination of the final remedy in the Onpost Record of Decision (ROD).

The IRA alternatives have been evaluated based on the following criteria:

- Overall protectiveness of human health and the environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) to the maximum extent practicable
- Reduction of mobility, toxicity, or volume
- Short-term and long-term effectiveness
- Implementability
- Cost

This Final Decision Document provides a summary of the alternative technologies considered, a chronology of the significant events leading to the initiation of the IRA, a summary of the preferred alternative for this IRA project, and a summary of the ARARs (legal and regulatory standards, criteria, or limitations) associated with the program.

As specified in the Federal Facility Agreement, this IRA will, by containment of a contamination source, to the maximum extent practicable, be consistent with and contribute to the efficient performance of the Final Response Action.

4.0

INTERIM RESPONSE ACTION ALTERNATIVES

This section describes the interim response action (IRA) alternatives developed in the IRA Alternatives Assessment for the Lime Settling Basins (WCC 1989a). These alternatives included:

- No action
- Monitoring
- Institutional controls
- Subsurface barrier with cap
- Subsurface barrier with groundwater extraction and treatment
- Multilayered cap
- Excavation and onsite temporary storage

All of these alternatives were subject to an evaluation in the IRA Alternatives Assessment. The IRA Alternatives Assessment for the Lime Settling Basins concludes that there may be some long-term benefit in performing an IRA now. Treatment after the arsenic has spread in the groundwater becomes both more complex and costly insofar as a larger area must be addressed.

Following is a description and a brief summary of the evaluation of each alternative. All of the alternatives can be designed and implemented to meet Applicable or Relevant and Appropriate Requirements (ARARs) to the maximum extent practicable. Details of the evaluation can be found in the IRA Alternatives Assessment for this site (WCC 1989a).

4.1 NO ACTION

This alternative consists of taking no action to contain or treat contaminated soil and sludge at the Lime Settling Basins. This alternative is not considered protective of human health and the environment. It would not reduce contaminant mobility, toxicity, or volume. This alternative has no short-term impacts, however, it also has no long-term effectiveness. It can be easily implemented at no cost. The no action alternative would not be inconsistent with any final remedy at the site.

4.2 MONITORING

This alternative consists of conducting upgradient and downgradient groundwater sampling and analysis. Monitoring would allow continued tracking of contaminant movement, thereby providing additional information which can be used to continue to evaluate the protection of human health and the environment. Monitoring would not reduce contaminant mobility, toxicity, or volume. It would have minimal short-term impacts on workers during monitoring well installation, which could be mitigated through the use of personal protective equipment. The long-term effectiveness of this alternative is limited to its use as an indicator of future impact at sensitive receptors. It can be easily implemented at relatively low cost. The monitoring alternative would not be inconsistent with any final remedy at the site. Groundwater monitoring would also be included in all following alternatives.

4.3 INSTITUTIONAL CONTROLS

This alternative consists of constructing a chain-link fence with controlled access points around the Lime Settling Basins. In addition, groundwater monitoring would be conducted. The monitoring aspect of this alternative would allow continued tracking of contaminant movement, thereby providing additional information which can be used to continue to evaluate the protection of human health and the environment. Monitoring would not reduce contaminant mobility, toxicity, or volume. This alternative would have minimal short-term impacts during fence construction, which could be easily mitigated through the use of personal protective equipment. Since RMA currently has limited access maintained by physical barriers and security personnel, additional site restrictions would be of limited effectiveness. It can be easily implemented at relatively low cost. These institutional controls would not be inconsistent with any final remedy at the site.

4.4 SUBSURFACE BARRIER WITH CAP

This alternative consists of constructing a subsurface barrier, such as a slurry wall or sheet pilings, around the Lime Settling Basins. In addition, groundwater monitoring would be conducted. The subsurface barrier would be anchored a minimum of 5 feet into the Denver Formation, which would provide a relatively impermeable base for the contained area. This would limit horizontal migration of contamination as a result of the alluvial groundwater flow that is in contact with the Lime Settling Basins.

Lime sludge, currently stockpiled in areas adjacent to the basins, would be relocated back into the settling basins area. A multilayered cap would then be constructed over the Lime Settling Basins. For the purposes of this study only, it has been assumed that the cap would consist of, from the base upwards, an 18-inch-thick layer of low permeability clay, a flexible membrane liner, a synthetic drainage net, a geotextile filter fabric, and a 1-foot

thick protective soil layer. The cap would be sloped from the center of the basins to facilitate runoff. The cap would reduce infiltration of precipitation and surface water.

This alternative is considered protective of human health and the environment, since the waste material is isolated from the surrounding environment. Both vertical and horizontal contaminant migration would be greatly inhibited. However, this alternative does not affect the toxicity of the material and may actually increase the volume of material that may ultimately require remediation, since some of the containment materials may come in contact with the sludge. Any minimal short-term impacts to workers or the community could be addressed through the use of personal protective equipment and engineering controls. The long-term effectiveness of this alternative is limited since this is a containment technology which does not actually remove or treat the source of contamination. This alternative could be readily implemented at a relatively moderate cost. Containment would be consistent with the final remedy because it would reduce potential contaminant migration.

4.5 SUBSURFACE BARRIER WITH GROUNDWATER EXTRACTION AND TREATMENT

This alternative consists of constructing a subsurface barrier, such as a slurry wall or sheet pilings, around the Lime Settling Basins. Lime sludge, currently stockpiled in areas adjacent to the basins, would be relocated back into the Lime Settling Basins area. The subsurface barrier would be anchored a minimum of 5 feet into the Denver Formation, which would provide a relatively impermeable base for the contained area. This would limit horizontal migration of contamination as a result of alluvial groundwater flow through the area. A soil and vegetative cover would be constructed over the area to reduce infiltration. In addition, groundwater monitoring would be conducted.

A groundwater extraction trench or wells would be constructed within the subsurface barrier. Sufficient groundwater would be periodically extracted from within the barrier, as necessary, to maintain an inward hydraulic gradient across the barrier. This would help limit the continued migration of contaminated alluvial groundwater, that might accumulate as a result of infiltration, across the barrier, and increase the efficiency of the barrier.

Any extracted groundwater would be treated to remove organic and inorganic contaminants. Treatment would be performed either at the CERCLA Wastewater Treatment System, or at a separate treatment system implemented and operated for this IRA.

This alternative is considered protective of human health and the environment. The subsurface barrier would isolate the sludge from the alluvial aquifer, while the groundwater extraction and treatment would remove contaminants from the aquifer. Therefore, the mobility of contaminants would be reduced. The toxicity and

volume of contaminants may also be reduced through treatment of extracted groundwater. The implementation of this alternative could be accomplished with minimal short-term impacts that could be mitigated through the use of personal protective equipment and engineering controls. Since this is a containment alternative, its long-term effectiveness is limited. It could be readily implemented with standard construction techniques at a relatively moderate cost. This containment alternative would be consistent with the final remedy because it would reduce potential contaminant migration.

4.6 MULTILAYERED CAP

This alternative would consist of constructing a multilayered cap over the Lime Settling Basins as described in subsection 4.4. In addition, groundwater monitoring would be conducted. Lime sludge currently stockpiled in areas adjacent to the Lime Settling Basins would be returned to the basins area. The cap would inhibit infiltration of precipitation and surface water. However, a cap would not address the horizontal flow of the alluvial aquifer through the Lime Settling Basins, which is probably a more significant migration pathway in this area than downward migration by infiltration.

This alternative is considered protective of human health and the environment. The cap would limit the downward mobility of the contaminants. However, it would have no effect on the toxicity of the sludge and may actually increase the volume of contaminated material that would ultimately have to be treated, since some of the cap materials would come in contact with the sludge. There would be minimal short-term impacts associated with the implementation of this alternative, which could be addressed through the use of personal protective equipment and engineering controls. Since this is a containment alternative, the long-term effectiveness is limited. This alternative could be implemented with straightforward construction techniques at a relatively low cost. Containment would be consistent with the final remedy because it would reduce potential contaminant migration.

4.7 EXCAVATION AND ONSITE TEMPORARY STORAGE

This alternative consists of excavating the contaminated soil and sludge in the Lime Settling Basins and placing the material in an onsite temporary waste pile. In addition, groundwater monitoring would be conducted. The temporary waste pile would be constructed with a clay liner and cap, as well as a synthetic liner, and leachate monitoring and collection sump. This alternative would isolate the contaminated material from the environment until a final remedy is selected.

This alternative is considered protective of human health and the environment, since the contaminated soil and sludge would be effectively isolated from the environment. The mobility of the contamination would be reduced.

However, the toxicity of the material would remain unchanged and the volume of material that would ultimately require treatment would increase, since some of the waste pile construction materials would require subsequent remediation. This alternative would have some short-term impacts that could be addressed through the use of personal protective equipment for construction personnel, and engineering controls for odor and dust control. Since this is a containment alternative, the long-term effectiveness is limited. A final remedy would probably require the treatment and possibly rehandling of the contaminated material. This alternative would preclude the use of an in situ treatment alternative for the final response action at this site. The operation could be implemented at a relatively high cost. Excavation with onsite temporary storage would be consistent with the final remedy insofar as it would reduce potential contaminant migration. However, this alternative would preclude the use of an in situ treatment technology for the final response action at this site.

4.8 CONCLUSIONS

The preferred alternative is construction of a subsurface barrier, such as a slurry wall or sheet pilings, and vegetative cover around the Lime Settling Basins. Groundwater will be extracted and treated, as necessary, to maintain an inward hydraulic gradient across the subsurface barrier. This containment alternative reduces the vertical and horizontal migration of contaminants. This alternative can be easily implemented since it is based on demonstrated technology that has been widely used. The long-term effectiveness of this alternative is somewhat limited because it is a containment technology that does not actually remove or treat the source of contamination. Periodic reevaluation would be necessary to assess the continued effectiveness of this containment system. This reevaluation would be based, in part, on the groundwater monitoring program that will be part of this alternative.

Containment is an appropriate IRA for the Lime Settling Basins because it will inhibit further migration of contaminants. In addition, the treatment technologies that may be feasible for the types and concentrations of contaminants at this site either have not been well demonstrated or are not cost-effective as an interim action. Containment is consistent with the final remedy because it will reduce potential contaminant migration and, if treatment is selected for the final response, the contaminated material will have already been contained and isolated. In addition, containment will not preclude the possible use of an in situ treatment alternative for the final response action at this site.

5.0
CHRONOLOGY OF EVENTS

The significant events leading to the proposed decision to contain soils in the Lime Settling Basins, as described in Section 6.0 of this report, are presented below.

<u>Date</u>	<u>Event</u>
June 1987	State of Colorado, Shell Oil Co., EPA, and the Army develop and agree in a June 1987 report to the court to a prospective hot spot list which identifies candidate interim response actions (IRAs) to be conducted. The hot spot list consists of five areas (the Section 36 Trenches, the Section 36 Lime Pits, the M-1 Settling Basins, the Motor Pool Area, and the Railroad Housing Track in the Rail Classification Yard) referred to as "Other Contamination Sources" in the proposed Consent Decree (Section 9.1, paragraph 1), and in the Federal Facility Agreement, paragraph 22.1 (1).
January 31, 1989	The Army instructs Woodward-Clyde Consultants (WCC) to develop plans for interim response investigation work in response to the hot spot list. Interim action investigation work includes the Lime Settling Basins.
April 13, 1989	A draft final Task Plan, which includes the Lime Settling Basins, is submitted by the Army to the Organizations and the State for comment.
April 17, 1989	Field investigations begin for the other contamination sources IRA. Work includes investigation of contaminant source(s) within the Lime Settling Basins.
June 29, 1989	A final Task Plan is issued by the Army with comments incorporated.
August 15, 1989	Draft Final Alternatives Assessment of Interim Response Actions for Other Contamination Sources - Lime Settling Basins and draft ARARs are distributed by the Army to the Organizations and the State for comment.
September 18, 1989	Field investigation completed.
November 3, 1989	Final Alternatives Assessment of Interim Response Actions for Other Contamination Sources - Lime Settling Basins is distributed by the Army to the Organizations and the State with comments incorporated.

November 27, 1989	Draft Final Results of Field and Laboratory Investigations Conducted for the Remediation of Other Contamination Sources Interim Response Action is distributed by the Army to the Organizations and the State.
November 27, 1989	Proposed Decision Document for the Interim Response Action at the Lime Settling Basins at the Rocky Mountain Arsenal is distributed by the Army to the Organizations and the State for comment.
December 7, 1989	Public meeting on the proposed Decision Document for the Interim Response Action at the Lime Settling Basins at the Rocky Mountain Arsenal.
February 28, 1990	Draft Final Decision Document for the Interim Response Action at the Lime Settling Basins at the Rocky Mountain Arsenal is distributed by the Army to the Organizations and the State with comments incorporated.
March 28, 1990	The Decision Document for the Interim Response Action at the Lime Settling Basins at the Rocky Mountain Arsenal is finalized and distributed by the Army to the Organizations and the State.

SUMMARY OF THE INTERIM RESPONSE ACTION

The preferred alternative is construction of a subsurface barrier, such as a slurry wall or sheet pilings, with a soil and vegetative cover at the Lime Settling Basins. Groundwater will be extracted and treated, as necessary, to maintain an inward hydraulic gradient across the barrier. This containment alternative reduces the vertical and horizontal migration of contaminants. This alternative can be easily implemented because it is based on demonstrated technology that has been widely used. The long-term effectiveness of this alternative is somewhat limited because it is a containment technology that does not actually remove or treat the source of contamination.

This alternative consists of constructing a 360-degree subsurface barrier around the Lime Settling Basins. The barrier will be anchored a minimum of 5 feet into the Denver Formation. Because the Denver Formation is relatively impermeable in this area, anchoring the barrier into the Denver Formation, together with a soil and vegetative cover, will inhibit potential downward and lateral contaminant migration. This will limit horizontal migration of contamination as a result of alluvial groundwater flow through the area. Lime sludge, currently stockpiled in areas adjacent to the basins, will be relocated back into the settling basins area prior to barrier construction. Soils excavated during barrier construction will be placed within the boundaries of the barrier and covered with the soil and vegetative cover.

A soil and vegetative cover will then be constructed over the Lime Settling Basins. The cover will be sloped from the center to facilitate runoff. The cover will inhibit continued downward migration of contaminants to the groundwater through surface infiltration.

A groundwater extraction trench or wells will be constructed within the subsurface barrier. Sufficient groundwater will be periodically extracted from within the barrier, as necessary, to maintain an inward hydraulic gradient across the barrier. This will help limit the continued migration of contaminated alluvial groundwater, that might accumulate as a result of infiltration, across the barrier, and increase the efficiency of the barrier. Any extracted groundwater will be treated to remove organic and inorganic contaminants. Treatment will be performed either at the CERCLA Wastewater Treatment System or at a separate treatment facility implemented and operated for this IRA.

6.1 HEALTH & SAFETY PLAN

A Health & Safety Plan has been developed for the prevention of occupational injuries and illnesses during field activities at RMA. This plan addresses health and safety requirements of contractors and their authorized

subcontractors. Compliance with this plan will be compulsory and the contractors will be responsible for self-enforcement and compliance with this plan. The Health & Safety Plan was developed taking into consideration known hazards as well as potential risks. Comprehensive environmental monitoring and site-specific personal protection are combined in an effort to best protect workers.

A site-specific Health & Safety Plan for work to be performed in the Lime Settling Basins Area will be developed.

INTERIM RESPONSE ACTION PROCESS

With respect to the Interim Response Action (IRA) for the remediation of other contamination sources for the Lime Settling Basins at Rocky Mountain Arsenal (RMA), the IRA process is as follows:

1. The scope of the IRA is described in the June 5, 1987 report to the Court of the United States (the Army and EPA), Shell, and the State in United States v. Shell Oil Co. A similar description is included in the proposed Consent Decree, paragraph 9.1 (l), and the Federal Facility Agreement (FFA), paragraph 22.1 (l).
2. The Organizations and DOI shall have the opportunity to participate, at the RMA Committee level, in the identification and selection of Applicable or Relevant and Appropriate Requirements (ARARs) that may be applicable to IRAs.
3. The Army issues the proposed Decision Document for the IRA for the interim remediation of other contamination sources, Lime Settling Basins, for a 30-day public comment period. During the 30-day comment period, the Army will hold one public meeting addressing the IRA decision. The proposed Decision Document is supported by an administrative record.
4. Promptly after the close of the comment period, the Army shall transmit to the other Organizations, Department of Interior (DOI), and the State, a Draft Final IRA Decision Document for the remediation of other contamination sources, Lime Settling Basins.
5. Within 20 days after the issuance of a Draft Final IRA Decision Document for the interim remediation of other contamination sources, Lime Settling Basins, an Organization (including the State if it has agreed to be bound by the Dispute Resolution process, as required by the FFA or DOI under the provisions set forth in the FFA) may invoke Dispute Resolution.
6. After the close of the period for invoking Dispute Resolution, if Dispute Resolution is not invoked, or after the completion of Dispute Resolution, if invoked, the Army shall issue a Final IRA Decision Document to the other Organizations, DOI, and the State. The Army shall also notify the public of the availability of the Final IRA Decision Document with the supporting administrative record. Only preliminary design work for the IRA may be conducted prior to the issuance of the Final IRA Decision Document.

7. The IRA Decision Document for the remediation activity at the Lime Settling Basins will be subject to judicial review in accordance with Section XXXIX of the Federal Facility Agreement except where such review is barred by Sections 113 and 121 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. Sections 6913 and 9621.
8. Following issuance of the Final IRA Decision Document, the Army shall be the lead party responsible for designing and implementing the IRA in conformance with the Decision Document. The Army shall issue a draft IRA Implementation Document to the DOI, the State, and the other Organizations for review and comment. The draft implementation document shall include final drawings and specifications, final design analysis, a cost estimate, and IRA deadlines for implementation of the IRA.
9. If any organization (including the State) or the DOI, believes that the IRA is being designed or implemented in a manner that will not meet the objectives for the IRA set forth in the Final IRA Decision Document, or is otherwise not being properly implemented, it may so advise the others and shall recommend how the IRA should be properly designed or implemented. Any organization (including the State, if it has agreed to be bound by the process of Dispute Resolution, as required by the FFA, or the DOI under the circumstances defined in the FFA) may invoke Dispute Resolution to resolve the disagreement.
10. As Lead Party for the design and implementation of this IRA, the Army will issue the final implementation document, as described above, and will be responsible for implementing the IRA in accordance with the IRA Implementation Document.

8.0

**APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES-
LIME SETTLING BASINS, INTERIM RESPONSE ACTION**

8.1 INTRODUCTION

These Applicable or Relevant and Appropriate Requirements (ARARs) address a specific area identified for interim remediation prior to the issuance of a Record of Decision (ROD) for the Onpost Operable Unit of the Rocky Mountain Arsenal. The Lime Settling Basins will be surrounded by a 360 degree subsurface barrier and covered with a low permeability layer to inhibit infiltration and provide containment during the interim period. Further remedial action will be addressed in the ROD for the Onpost Operable Unit of the Rocky Mountain Arsenal.

8.2 AMBIENT OR CHEMICAL-SPECIFIC ARARS

Ambient or chemical-specific requirements set concentration limits or ranges in various environmental media for specific hazardous substances, pollutants, or contaminants. Such ARARs either set protective cleanup levels for the chemicals of concern in the designated media or indicate an appropriate level of discharge based on technological considerations.

The objectives of this IRA are discussed in the Final Assessment Document and the Final Decision Document. This IRA will be implemented prior to the final remediation to be undertaken in the context of the Onpost Operable Unit ROD. This IRA will not involve an interim remediation of soils or groundwater, but will utilize a containment approach to control the contaminants during the interim period, leaving further remediation to be determined in the Onpost ROD. Dewatering may be conducted pursuant to this IRA. Any liquids generated through dewatering are intended to be treated at the CERCLA Wastewater Treatment System and chemical-specific ARARs for liquid treatment will be reflected in the Decision Document concerning that IRA. No ambient or chemical-specific ARARs were identified concerning levels of contaminants for soils which are placed in such containment structures.

8.3 LOCATION-SPECIFIC ARARS

Location-specific requirements set restrictions on activities, depending on the characteristics of the site or the immediate environment, and function like action-specific requirements. Alternative remedial actions may

be restricted or precluded, depending on the location or characteristic of the site and the requirements that apply to it.

Paragraph 44.2 of the Federal Facility Agreement provides that "wildlife habitat(s) shall be preserved and managed as necessary to protect endangered species of wildlife to the extent required by the Endangered Species Act (16 U.S.C. 1531 et seq.), migratory birds to the extent required by the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.), and bald eagles to the extent required by the Bald Eagle Protection Act, 16 U.S.C. 688 et seq."

While this provision is not an ARAR, the statutes reflected in it are ARARs, applicable to this interim action, and must be complied with. Based on where this containment system is to be located the Army believes that this IRA will have no adverse impact on any endangered species or migratory birds or on the protection of wildlife habitats. Coordination will be maintained with the U.S. Fish and Wildlife Service to ensure that no such adverse impact arises from implementation of this IRA.

The Army considers relevant and appropriate and will comply with 40 CFR 6.302(a) and (b) concerning the location of this containment system, avoiding the construction of this system in a manner that would have an adverse impact on wetlands or be within a flood plain, where possible.

The regulations at 40 CFR 230 were reviewed and determined not to be applicable within the context of this IRA because no discharge of dredged or fill material into waters of the United States is included in this IRA. Because these regulations address only the disposal of such materials into the waters of the United States, which is not contemplated, they are not considered to be relevant and appropriate to apply in the context of this IRA.

The regulations at 33 CFR 320-330 were reviewed and determined to be neither applicable nor relevant and appropriate because they address actions affecting the waters of the United States. No such actions are contemplated within the context of this IRA.

8.4 ACTION-SPECIFIC ARARS

8.4.1 Description

Performance, design, or other action-specific requirements set controls or restrictions on activities related to the management of hazardous substances, pollutants, or contaminants. These action-specific requirements

may specify particular performance levels, actions, or technologies as well as specific levels (or a methodology for setting specific levels) for discharged or residual chemicals.

8.4.2 Construction of Containment System

8.4.2.1 Air Emissions

On the limited possibility that there may be air emissions during the course of the construction of this containment system, the Army has reviewed all potential ambient or chemical-specific air emission requirements. As a result of this review, the Army found that there are, at present, no National or State ambient air quality standards currently applicable or relevant and appropriate to any of the volatile or semivolatiles chemicals in the soils or groundwater found in the area in which construction is contemplated.

In the context of this IRA, there is only a limited chance of any release of volatiles or semivolatiles and, even if such a release did occur, it would only be intermittent and of very brief duration (because the activity that produced the release would be stopped and modified appropriately if a significant air emission was detected by the contractor's air monitoring specialist). The Army has significant experience with the construction of extraction wells, reinjection wells, and slurry walls which are similar to the construction of the subsurface barrier which is included in this IRA, and has not experienced any problems from air emissions during construction of such facilities. The site-specific Health and Safety Plan will adequately address these concerns. This plan, to be developed for use in the IRA, will detail operational modifications to be implemented in the event monitoring detects specific levels of such emissions.

The National Emissions Standards for Hazardous Air Pollutants (NESHAPS) were evaluated to determine whether they were applicable or relevant and appropriate to apply in the context of construction of this IRA. These standards were not considered applicable because they apply to stationary sources of these pollutants, not to construction activity. These standards were not considered relevant and appropriate because they were developed for manufacturing processes, which are significantly dissimilar to the short-term construction activity contemplated by this IRA.

The provisions of 40 CFR 50.6 will be considered relevant and appropriate. This standard is not applicable because it addresses Air Quality Control Regions, which are areas significantly larger than and different from the area of concern in this IRA. Pursuant to this regulation, there will be no particulate matter transported by air from the site that is in excess of 50 micrograms per cubic meter (annual geometric mean) and 150 micrograms per cubic meter (maximum 24-hour concentration) will not be exceeded more than once per year.

8.4.2.2 Worker Protection

The provisions of 29 CFR 1901.120 are applicable to workers at the site because these provisions specifically address hazardous substance response operations under CERCLA. It should be noted that these activities are presently governed by the interim rule found at 29 CFR 1910.120 but that by the time IRA activity commences at the site, the final rule found at 54 FR 9294 (March 6, 1989) will be operative. (The final rule becomes effective on March 6, 1990.)

8.4.2.3 General Construction Activities

The following performance, design, or other action-specific State ARARs have been preliminarily identified by the Army as applicable to this portion of the IRA and more stringent than any applicable or relevant and appropriate federal standard, requirement, criterion, or limitation:

- Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 1001-3, Part III(D)(2)(b), Construction Activities:
 - a. Applicability - Attainment and Nonattainment Areas
 - b. General Requirement -- Any owner or operator engaged in clearing or leveling of land or owner or operator of land that has been cleared of greater than one (1) acre in nonattainment areas for which fugitive particulate emissions will be emitted shall be required to use all available and practical methods which are technologically feasible and economically reasonable in order to minimize such emissions, in accordance with the requirements of Section III.D. of this regulation.
 - c. Applicable Emission Limitation Guideline -- Both the 20% opacity and the no off-property transport emission limitation guidelines shall apply to construction activities; except that with respect to sources or activities associated with construction for which there are separate requirements set forth in this regulation, the emission limitation guidelines there specified as applicable to such sources and activities shall be evaluated for compliance with the requirements of Section III.D. of this regulation. (Cross Reference: Subsections e. and f. of Section III.D.2 of this regulation).
 - d. Control Measures and Operating Procedures -- Control Measures or operational procedures to be employed may include but are not necessarily limited to planting vegetation cover, providing

synthetic cover, watering, chemical stabilization, furrows, compacting, minimizing disturbed area in the winter, wind breaks, and other methods or techniques.

- Colorado Ambient Air Quality Standards, 5 CCR 1001-14, Air Quality Regulation A, Diesel-Powered Vehicle Emission Standards for Visible Pollutants:

- a. No person shall emit or cause to be emitted into the atmosphere from any diesel-powered vehicle any air contaminant, for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 40% opacity, with the exception of Subpart B below.
- b. No person shall emit or cause to be emitted into the atmosphere from any naturally aspirated diesel-powered vehicle of over 8,500 lbs gross vehicle weight rating operated above 7,000 feet (mean sea level), any air contaminant for a period of 10 consecutive seconds, which is of a shade or density as to obscure an observer's vision to a degree in excess of 50% opacity.
- c. Diesel-powered vehicles exceeding these requirements shall be exempt for a period of 10 minutes, if the emissions are a direct result of a cold engine start-up and provided the vehicle is in a stationary position.
- d. This standard shall apply to motor vehicles intended, designed, and manufactured primarily for use in carrying passengers or cargo on roads, streets, and highways.

- Colorado Noise Abatement Statute, C.R.S. Section 25-12-103:

- a. Each activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of twenty-five feet or more there from in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

<u>Zone</u>	<u>7:00 a.m. to next 7:00 p.m.</u>	<u>7:00 p.m. to next 7:00 a.m.</u>
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light Industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

- b. In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in subsection (1) of this section may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.
- c. Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of five db(A) less than those listed in Subpart (a) of this section.
- d. Construction projects shall be subject to the maximum permissible noise levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of the project.
- e. For the purpose of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than five miles per hour.
- f. In all sound level measurements, consideration shall be given to the effect of the ambient noise level created by the encompassing noise of the environment from all sources at the time and place of such sound level measurements.

In substantive fulfillment of Colorado Air Pollution Control Commission Regulation No. 1, this IRA will employ the specified methods for minimizing emission from fuel burning equipment and construction activities. In substantive fulfillment of Colorado's Diesel-Powered Vehicle Emission Standards, no diesel motor vehicles associated with the construction shall be operated in a manner that will produce emissions in excess of those specified in these standards.

The noise levels pertinent for construction activity provided in C.R.S. Section 25-12-103 will be attained in accordance with this applicable Colorado statute.

8.4.2.4 Wetlands Implications

Through estimation of the area where the containment system will be located, the Army does not believe that any wetlands could be adversely affected. However, until a final design is selected and a final sitting decision made, it cannot be definitively determined that no impact on wetlands will occur. If the final site selection and/or design results in an impact on wetlands, the Army will review the regulatory provisions concerning wetlands impact and other appropriate guidance, and will proceed in a manner consistent with

those provisions. Coordination will be maintained with the U.S. Fish and Wildlife Service concerning any potential impacts on wetlands.

8.4.2.5 Land Disposal Restrictions and Removal of Soil and Debris

There are no action-specific ARARs that pertain to the excavation and relocation of soil to the Lime Settling Basins area during the construction of this containment system which can be specifically identified at this time. The relocation of lime sludges to the Lime Settling Basins will occur within the "area of contamination", as defined in current EPA guidance. The Army will act consistent with the EPA guidance in effect for CERCLA actions at the time that construction and soil relocation occur. Construction debris will be managed consistent with the EPA guidance then in effect at the time it is generated.

EPA is currently developing guidance concerning the Land Disposal Restrictions (LDR), particularly the applicability of these to CERCLA actions. While guidance is limited, the Army has not determined that any waste subject to LDR will be present in the soil removed by this IRA. More listings are scheduled to be completed prior to the implementation of this IRA and the Army will review these as they are released. If it is determined that a restricted disposal waste is present, the Army will act in a manner consistent with EPA guidance in effect at the time of the action for the management of such materials within the context of CERCLA actions.

Although removal of soil from the area where the containment system will be located, without returning that soil to the area, is a TBC, not an ARAR, it will be performed in accordance with the procedures set forth in the Task No. 32 Technical Plan, Sampling Waste Handling (November 1987), and EPA's July 12, 1985, memorandum regarding "EPA Region VIII Procedure for Handling of Materials from Drilling, Trench Excavation and Decontamination during CERCLA RI/FS Operations at the Rocky Mountain Arsenal." Soils generated by excavation during the course of this IRA, either at surface or subsurface, may be returned to the location from which they originated (i.e., last out, first in). Any materials remaining after completion of backfilling that are suspected of being contaminated (based on field screening techniques) will be properly stored, sampled, analyzed, and ultimately disposed as CERCLA hazardous wastes, as appropriate.

Throughout the construction of this containment system, the Army will comply with EPA guidance then in effect concerning the management of CERCLA hazardous substances during CERCLA remedial actions.

For material determined to be hazardous waste resulting from construction activities, substantive RCRA provisions are applicable to their management. These substantive provisions include but are not limited to: 40 CFR Part 262 (Subpart C, Pre-Transport Requirements), 40 CFR part 263 (Transporter Standards), 40

CFR Part 264 (Subpart I, Container Storage and Subpart L, Waste Piles) and any more stringent substantive provisions of comparable state regulations contained in 6 CCR 1007-3. The specific substantive standards applied will be determined by the factual circumstances of the accumulation, storage or disposal techniques actually applied to any such material.

8.4.2.6 Soil Treatment and Disposal

These proposed remedial actions do not include the possibility for onsite or offsite disposal of soils or contaminated material excavated pursuant to this IRA, except during construction activities which are discussed above.

8.4.2.7 Construction of Slurry Wall and Cover

The cover to be constructed pursuant to this IRA is not intended to be a permanent cover of the same type as utilized for the closure of landfills. This cover will minimize infiltration and promote drainage away from the Lime Settling Basins. The substantive standards contained in 40 CFR § 264.310, specifically those requirements contained in subsections a(2)-(4) and b(1) and (4), which describe necessary standards and actions concerning landfill covers, are considered relevant and appropriate to apply to the construction and continued operation of the cover constructed pursuant to this IRA.

8.5 COMPLIANCE WITH THE OTHER ENVIRONMENTAL LAWS

As is evident from the various portions of this document, this IRA was prepared in substantive compliance with 40 CFR 1502.16 (the regulations implementing the National Environmental Policy Act of 1969).

**9.0
SCHEDULE**

The Draft Implementation Document is scheduled for completion on November 1, 1990. The construction schedule will be contained in the Draft Implementation Document for this Interim Response Action (IRA). This milestone has been developed based upon the Final Assessment Document and the assumption that no dispute resolution will occur. If events that necessitate a schedule change or extension occur, the change will be incorporated in accordance with the Federal Facility Agreement.

10.0

CONSISTENCY WITH THE FINAL REMEDIAL ACTION

The Federal Facility Agreement states that all Interim Response Actions (IRAs) shall "to the maximum extent practicable, be consistent with and contribute to the efficient performance of Final Response Actions" (paragraph 22.5).

The alternative assessment criteria (WCC 1989) were used to evaluate the interim response action alternatives. The selected alternative, by providing significant control of a source of contamination for the period during which final response actions are being developed, will be consistent with any Final Response Action.

11.0
REFERENCES

Ebasco Services, Inc. 1989. June. Proposed Final Remedial Investigation Report, Volume XI, North Central Study Area, Version 3.2. RIC 89166R07.

Environmental Science and Engineering, Inc. 1987a. June. Final Phase I Contamination Assessment Report, Site 36-4, Lime Settling Basins, Version 3.3, Task No. 1. RIC 87203R02.

Environmental Sciences and Engineering, Inc. 1987b. September. Final Phase II Data Addendum, Site 36-4, Lime Settling Basins, Version 3.1. RIC 87203R02A

Woodward-Clyde Consultants. 1989a. Final Alternatives Assessment of Interim Response Actions for Other Contamination Sources - Lime Settling Basins.

Woodward-Clyde Consultants. 1989b. Results of Field and Laboratory Investigations Conducted for the Remediation of Other Contamination Sources Interim Response Action. Version 2.0.

APPENDIX A
COMMENTS AND RESPONSES



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

Recd
29 Dec 89
1:30
skp

DEC 27 1989

Ref: 8HWM-SR

Mr. Donald L. Campbell
Office of the Program Manager
Rocky Mountain Arsenal
ATTN: AMXRM-PM
Commerce City, Colorado 80022-2180

Re: Rocky Mountain Arsenal (RMA)
Proposed Decision Document for
the Interim Response Action at
the Lime Settling Basins,
November 1989.

Dear Mr. Campbell:

We have reviewed the above referenced report and have the enclosed comments. We particularly wish to emphasize our concerns in the following areas:

1. the lack of adequate definition of the extent of contamination upgradient, within, and downgradient of the basins;
2. the lack of adequately assessing the benefits of a groundwater extraction and treatment system;
3. the lack of establishment of ARARs to enable the effective monitoring of the efficiency of the IRA.

Extensive revisions to address our concerns may result in a need to reissue the Proposed Decision Document or otherwise modify the schedule for the Draft Final Decision Document.

Comments on the revised Assessment Document are being sent in a separate letter. Please contact Linda Jacobson at (303) 294-7093, if you have questions on this matter.

Sincerely,

Connally Mears

Connally Mears
EPA Coordinator for RMA Cleanup

Enclosure

RMA 90 - 0002 1/2

cc: Col. Dan Voss, RMA-PMO
J. D. Smith, RMA-PMO
Jeff Edson, CDH
David Shelton, CDH
Vicky Peters, CAGO
Lt. Col. Scott Isaacson
Chris Hahn, Shell
R. D. Lundahl, Shell
Robert Foster, DOJ

RESPONSE TO COMMENTS FROM THE EPA
ON THE PROPOSED DECISION DOCUMENT
FOR THE INTERIM RESPONSE ACTION
AT THE LIME SETTLING BASINS
NOVEMBER 1989

Comment 1: Page 1-1, please clarify whether the "relocation of sludge material . . . to the Lime Settling Basins" is occurring within the area of contamination and if it constitutes a new placement for purposes of the LDRs.

Response: Based on the assessment of the Phase I and Phase II soil sampling programs and additional observations from the IRA field investigation, it appears that some of the sludges from the central area of the Lime Settling Basins were removed at some time and spread out adjacent to the basins. In the North Central Study Area Report (Ebasco 1989), the Lime Settling Basins area is expanded to include areas to the north, south, and west of the basins because these areas have materials that are characteristic of the Lime Settling Basins.

It is assumed, for the purpose of evaluation, that material previously placed adjacent to the Lime Settling Basins would be replaced, to the extent practicable, in the area of the basins before construction of the subsurface barrier and cover. This will reduce the area that must be encompassed within the subsurface barrier and cover, and will reduce the amount of fill material required to regrade the site. Replacement of this material does not constitute a new placement for purposes of the land disposal restrictions.

Comment 2: Neither the Alternative Assessment nor the Decision Document discuss the lateral extent of contamination. Further, both documents fail to discuss the contaminant migration rate and the extent and magnitude of the existing plume emanating from the Lime Settling Basins. The Army should develop and document further information on the existing extent of the contamination and the migration rate from existing releases. The provision of this information will assist in the determination of the adequacy of the proposed remedial action, its scope and design, and/or the need for another IRA to address past releases. Section 2.0 should be expanded or another section should be added to summarize the magnitude of contamination upgradient, within, and downgradient of the basins.

Response: Details of the nature and extent of contamination in the Lime Settling Basins area can be found in the final IRA alternatives assessment for this site (WCC 1989a) and the Phase I and Phase II Contamination Assessment Reports (ESE 1987a and 1987b). The objective of this IRA is to mitigate the threat of releases from the Lime Settling Basins on an interim basis. The subsurface barrier and cover with groundwater extraction and treatment alternative is based on proven technology that is adequate to meet this objective. Aquifer remediation will be addressed in the final Record of Decision (ROD).

Comment 3: Pages 4-2 and 4-3, does this alternative require periodic dewatering of the contained sludges? As stated in Section 4-5, "Sufficient groundwater . . . extracted periodically from within the slurry wall . . . (would) maintain a reverse hydraulic gradient across the wall. This would help limit the

continued migration of contaminated alluvial groundwater across the wall that might accumulate as a result of infiltration."

The construction of a slurry wall should mitigate groundwater transport from the Lime Settling Basins. However, we believe that an effective utilization of a slurry trench should include groundwater extraction from the contained alluvium. Groundwater extraction would accomplish the following: a) assure an inward hydraulic gradient across the slurry trench barrier towards the basins, thus better assuring horizontal containment, b) reduce the hydraulic head on the Denver formation, thus reducing the chances of vertical permeation of contaminants into the Denver formation, and c) contribute to reduction of contaminants within the basins utilizing existing treatment facilities.

The wastes generated from such periodic groundwater extraction and treatment would eventually be generated during onpost groundwater remediation anyway. Their treatment should not represent an exceptional added cost to the IRA, but does represent an opportunity to further pursue the IRA objectives.

Further, establishment of a slurry wall within this area would impact groundwater flow patterns, potentially redirecting contaminated groundwater into less contaminated areas. Assessment of that potential problem should be done before the Decision Document is finalized.

Response: In response to comments from the Organizations and the State, the Army has reconsidered the preferred IRA Alternative for the Lime Settling Basins. The subsurface barrier with the soil and vegetative cover alternative will include periodic dewatering of the contained sludges, as necessary, to maintain an inward hydraulic gradient across the barrier. The cover will help minimize infiltration into the contained area, thereby further reducing the potential for an outward hydraulic gradient across the barrier.

The hydraulic head within the subsurface barrier will be reduced only to the extent necessary to maintain an inward gradient. Reducing the hydraulic head on the Denver Formation to this extent, over only a 5-acre site, would have an inconsequential effect on vertical permeation of contaminants into the Denver Formation in the area.

The extracted groundwater will be treated at the CERCLA Liquid Waste treatment facility if that facility is in operation, otherwise, it will be treated at a separate treatment facility implemented and operated for this IRA.

Since the aquifer in Section 36 is contaminated from the South Plants Area, it is not anticipated that impacts on groundwater flow patterns from establishment of a subsurface barrier around the Lime Settling Basins area would likely redirect contaminated groundwater into less contaminated areas.

Comment 4: Page 4-4, monitoring should be done to ensure the efficiency of the containment system in "mitigating further releases". Without levels of existing contamination being established, please state what will serve as the baseline to denote further releases. Please state whether sufficient

monitoring wells exist in close proximity to the Lime Settling Basins to allow early detection of significant releases.

Please incorporate an operational monitoring program into the Decision Document. The program should be designed to monitor the effectiveness of the selected remedy in mitigating contaminant transport in both the surficial alluvium and the Denver formation.

Response: The operational monitoring program will be developed during the design of this IRA. The necessity for additional monitoring wells to allow early detection of significant releases will be determined at that time. The baseline used to denote further releases will also be determined during design. However, this IRA is not intended to specifically address the Denver Formation. As stated in the response to EPA's comment No. 3, the groundwater extraction system will do little to prevent vertical permeation of the groundwater into the Denver Formation within the subsurface barrier.

Comment 5: As an exercise to illuminate the issue, we made calculations that show that even if a porosity as high as 50% is assumed for the alluvium beneath the basins, the total recharge from rainfall in the absence of a cap would only be about 2,000,000 gallons per year less evaporation or a head increase within the alluvium of about 2 to 3 feet. In the absence of a cap, the infiltration of precipitation would continue to transport contaminants to the alluvium, and thus periodically to a treatment system through new extraction wells. Periodic extraction of less than 200,000 gallons per month would maintain the inward gradient towards the basins, unless the slurry trench leaks excessively.

The benefits of eliminating the cap, and extracting and treating 200,000 gallons per month of infiltration, plus leakage through the slurry trench, while assuring an inward gradient, should be evaluated before the final decision is proposed.

Response: A groundwater extraction and treatment system has been reevaluated for this site in response to comments from the Organizations and the State. The preferred alternative in the Final Decision Document for this site is to construct a subsurface barrier with a soil and vegetative cover. Groundwater will be extracted, as necessary, to maintain an inward hydraulic gradient across the barrier. The extracted water will be treated either at the CERCLA Wastewater Treatment System or at a separate facility implemented and operated for this IRA.

Comment 6: The Decision Document needs to more fully evaluate for each alternative the IRA's consistency with and contribution to the efficient performance of the Final Response Action. More detail addressing this important aspect of the IRA is needed than the single sentence at the end of paragraph 4.8, Conclusion.

Response: The alternative evaluation summary has been expanded to include discussion of consistency with the final remedy for each alternative (Section 4.0).

Comment 7: On page 3-1, Evaluation Criteria, the document states that seven criteria were used; however, on page 4-1, the text states that "(a)lternatives that reduced contaminant mobility, toxicity, or

volume (MTV) are preferred. One of the evaluation criteria that showed the greatest variability between alternatives was the ability of an alternative to reduce contaminant mobility, toxicity, or volume." The slurry wall with cap, slurry wall with groundwater extraction and treatment, and the excavation and onsite temporary storage alternatives, if properly implemented, offer essentially the same mobility reduction benefits. Only the slurry wall with groundwater extraction and treatment alternative has a potential to reduce toxicity and volume (through treatment and destruction of contaminants). The other six alternatives do not reduce toxicity or volume and are identical in this respect. This further supports our earlier contention (see Comment 3) that the slurry wall with groundwater extraction and treatment should be reevaluated.

Response: In response to comments from the Organizations and the State, the preferred alternative in this Final Decision Document is construction of a subsurface barrier and vegetative cover at the Lime Settling Basins, with groundwater extraction, as necessary, to maintain an inward hydraulic gradient across the barrier. The Army agrees that contaminant toxicity and volume may be reduced if it is necessary to extract and treat groundwater to maintain the inward hydraulic gradient.

Comment 8: On page 4-3, Slurry Wall with Groundwater Extraction and Treatment, the Decision Document states that "(t)he treatment process would generate a waste sludge for subsequent treatment and disposal. Therefore the total volume of waste material to be treated would increase." A waste treatment system would destroy organic materials and concentrate the heavy metals, thus decreasing the overall volume of both contaminants and contaminated material. Through extraction and treatment there would also be fewer contaminants in contact with groundwater. Total contaminated material in the ground would decrease, and total mass would decrease because contaminants are being removed and handled properly. We do not agree with your statements to the contrary.

This is the only alternative presented that includes treatment as a means of addressing the problem. No discussion is presented on the SARA preference for treatment as the principal remedy. The remedy proposed needs careful reanalysis.

Response: This statement has been deleted from the text. The preferred alternative in this Final Decision Document is a subsurface barrier with soil and vegetative cover, with groundwater extraction, as necessary, to maintain an inward hydraulic gradient across the barrier. It should be noted, however, that this interim action is not intended or designed to be the final remedy as the EPA eludes to with reference to SARA preference. This interim action follows the guidelines established in the Federal Facility Agreement.

Comment 9: In reference to page 8-2, the Endangered Species Act is a location-specific ARAR, per EPA guidance (CERCLA Compliance with Other Laws Manual).

Response: The Endangered Species Act is listed as a location-specific ARAR in the Final Decision Document.

Comment 10: On page 8-4, the text states that Colorado construction air quality regulations "are not applicable because they specifically do not address a remedial action or circumstance under CERCLA." Construction regulations regardless of location or statute under which they are performed should be considered relevant and appropriate. Please reassess the validity of this statement.

Response: These regulations are identified as applicable in the Final Decision Document.

Comment 11: Wetlands are a location specific ARAR, not an action specific ARAR (see page 8-7).

Response: Wetlands considerations are identified as a location-specific ARAR in the Draft Final Decision Document. They are also discussed as an action-specific ARAR because wetlands considerations could affect actions taken during construction.

Comment 12: The document on page 8-7, Land Disposal Restrictions and Removal of Soil, states that "There are no action-specific ARARs that pertain to the excavation and relocation of soil to the Lime Settling Basins during construction of this treatment system." Containment without groundwater extraction and discharge is not "treatment". The IRA involves handling and disposal of RCRA regulated substances, hence, RCRA is applicable.

Response: The Final Decision Document reflects that the Army will proceed consistent with EPA guidance concerning the handling of soils during construction of the facilities related to this IRA. The cited language has been modified in response to this comment.

Comment 13: On page 8-1, Ambient or Chemical-Specific ARARS, the document states that "No ambient or chemical-specific ARARs were identified concerning level of contaminants for soils that are placed in such containment structures." MCLs for groundwater protection exist and should be selected as ARARs, if a pump and treat system is incorporated into this IRA. Further, the IRA will produce construction debris, decontamination liquids, and other fluids containing RCRA regulated wastes. RCRA is applicable for their handling and disposal.

Response: Any liquids generated through dewatering are intended to be treated at the CERCLA Wastewater Treatment System and chemical-specific ARARs for liquid treatment will be reflected in the decision document concerning that IRA. The Draft Final Decision Document discusses the management of materials generated during IRA construction.

Comment 14: We reserve the right to further select the ARARs for this IRA, after response to our comments and as the decision, design, and implementation proceed.

Response: The Draft Final Decision Document identifies ARARs for this IRA. Some ARARs are identified in general terms where the future design determinations will affect the identification of specific requirements which will apply. The Implementation Document will reflect greater detail concerning the specific design of this IRA. The Implementation Document is provided to EPA, the other Organizations and the State for review and comment. Further definition of specific ARARs should occur in the context of this document.

Shell Oil Company



One Shell Plaza
P.O. Box 4320
Houston, Texas 77210

Rec'd
21 Dec 89
10:35
skp

December 19, 1989

Office of the Program Manager for Rocky Mountain Arsenal
ATTN: AMXRM-PM: Mr. Donald L. Campbell
Rocky Mountain Arsenal, Building 111
Commerce City, Colorado 80022-2180

Dear Mr. Campbell:

Enclosed herewith are Shell Oil's comments on the Proposed Decision Document for the Interim Response Action at the Lime Settling Basins, November, 1989, Version 2.0. Shell's comments on ARAR's are being sent under separate cover.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. D. Lundahl".

R. D. Lundahl
Manager Technical
Denver Site Project

/ajg

Enclosure

cc: (w/enclosure)
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Hazardous Materials and Waste Management Division
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Denver, CO 80220

RESPONSE TO COMMENTS FROM SHELL OIL COMPANY
ON PROPOSED DECISION DOCUMENT
FOR THE INTERIM RESPONSES ACTION
AT THE LIME SETTLING BASINS
VERSION 2.0
NOVEMBER 1989

GENERAL COMMENT

Comment 1: In Shell's opinion, data presented in the recently issued report¹ describing 1989 laboratory and field investigations of the Lime Settling Basins fail to validate the undocumented conclusion used by the Army in preparing the Alternative Assessment that this site is an active source of arsenic contamination¹. Although elevated concentrations of arsenic were detected in wells immediately downgradient of both the M-1 and Lime Settling Basins, arsenic concentrations decline very rapidly short distances downgradient of these wells. Since these basins have existed since 1942, the data suggest that arsenic in the form present in the basins is relatively immobile. Studies² in the literature on arsenic mobility support that certain inorganic species of arsenic are essentially immobile in soil.

Even if the Lime Settling Basins are considered an active source, because of the very slow movement of arsenic it seems unlikely that a long term technical or cost benefit would be gained by conducting an interim response action at this site. Shell urges the Army to reconsider whether any action other than Monitoring/Maintenance would be appropriate, i.e., is the site an active source and, if so, specifically what benefit(s) would be expected from an interim response action? Pursuant to the Decision Flow Chart (Figure 1-1), Monitoring/Maintenance is the appropriate action if either the site is not an active primary source, data are inadequate to determine whether it is an active source, or there is no clear identifiable benefit from conducting an interim response action.

Response: Based on available data, the Lime Settling Basins appear to be an active source of arsenic contamination to the groundwater. The Army agrees that the arsenic appears to attenuate rapidly. However, the Army believes there is a benefit in containing this source by implementing a subsurface barrier and cap at the Lime Settling Basins, with groundwater extraction, as necessary, to maintain an inward hydraulic gradient across the barrier. The groundwater intersects the sludge in the Lime Settling Basins during part of the year. The subsurface barrier will inhibit the lateral migration of contaminants with the groundwater

¹ "Results of Field and Laboratory Investigations Conducted for the Remediation of Other Contamination Sources Interim Response Action November, 1989, Version 2.0. This report, which was issued concurrently (November 27, 1989) with the Proposed Decision Document, presents studies on which the Army concluded in the Alternative Assessment document that this site is an active source.

² See Shell's comments, dated December 19, 1989 to D.L. Campbell, on the report listed in footnote No. 1.

that appears to be taking place. Also, a minimal cap and site grading may be appropriate because of the low infiltration rate in this area. This alternative would not be inconsistent with any final remedy.

SPECIFIC COMMENTS

Comment 1: Page 2-1, first paragraph.

Put between 1947 and 1982 at the end of the last sentence. This time period relates to manufacturing, not lease.

Response: The text has been changed.

Comment 2: Page 2-1, second paragraph.

Would aqueous rather than liquid better describe Army wastes discharged to unlined evaporation ponds?

Response: The text has been changed to describe the wastes as "wastewater."

Comment 3: Page 2-4, last paragraph.

Shell Oil Company is a signatory of the Federal Facility Agreement.

"The Federal Facility Agreement specifies 13 Interim Response Actions (IRA's) determined to be necessary and appropriate."

However, for the Remediation of Other Contamination Sources IRA, the Federal Facility Agreement states that "This action consists of assessment and, as necessary, the selection and implementation of an IRA for the . . . Section 36 Lime Pits . . ." (Article 22.1(l); emphasis added).

Response: The Army interprets the FFA's definition of an IRA to be the process which consists of assessment and, as necessary, the implementation of an interim action. Therefore, assessment of the 13 IRAs is necessary, but implementation of an interim action may or may not be necessary, as determined by the assessment for this site.

The Army conducted the IRA Alternatives Assessment of the Lime Settling Basins and has determined that the interim action alternatives chosen for implementation is necessary and appropriate.

Comment 4: Page 4-1, 4.0 Interim Response Action Alternatives.

Although long-term effectiveness is less important for an interim response action than for a final response action, this criterion seems to receive major emphasis in these summaries, whereas short-term effectiveness (e.g., impact on workers and the community) is hardly mentioned.

Response: The text has been changed to provide a more balanced summary of the detailed evaluation presented in the IRA Alternatives Assessment for the Lime Settling Basins (WCC 1989).

Comment 5: Page 4-2, 4.4 Slurry Wall with Cap and 4.6 Multilayered Cap.

The multilayered cap described for inhibiting surface infiltration is far more complex than is necessary for short-term use. A contoured, low-permeability layer of clay plus a vegetative cover would substantially reduce infiltration.

Response: The cap design presented is for purposes of evaluation. The final cap design will be determined during the design of this IRA. The Army agrees that, given the low rate of infiltration in this area, a cap similar to the one described in this comment may be more appropriate. This determination would be made during design.

Comment 6: Page 4-4, 4.8 Conclusions.

As discussed under General Comments, on the basis of results of the 1989 field and laboratory investigations, the Army should reconsider the Monitoring/Maintenance alternative.

Response: See response to Shell's General Comment.

Comment 7: Page 5-1, 5.0 Chronology of Events.

Reference to the report issued on 1989 field and laboratory investigations should be included in this chronology.

The entry for February 1988 should be deleted, because it is outside the process prescribed by the FFA. See paragraph 22.7 of the FFA. If the entry is to be retained, a date should be provided for the request, so that the Organizations may verify that such a request was in fact made. The March 7, 1988 letter from David L. Anderson to Edward J. McGrath includes a summary of the status of various requests for ARAR identifications, but does not mention any request in connection with this IRA.

Response: The text has been changed to include reference to the field and laboratory report. The February 1988 entry has been deleted.

Comment 8: Page 7-1.

Paragraphs 2. and 3. should be eliminated, because they do not apply to the Lime Settling Basins portion of the "Hot Spots" IRA.

Response: These paragraphs have been deleted.

Comment 9: Page 7-1, paragraph 4.

To conform to paragraph 22.7 of the FFA, replace "The Army, Shell, and State are given the opportunity to identify, on a preliminary basis," with "The Organizations and DOI shall have the opportunity to participate, at the RMA Committee level, in the identification and selection of."

Response: The text has been changed.

RESPONSES TO COMMENTS FROM SHELL OIL COMPANY
ON THE APPLICABLE OR RELEVANT AND APPROPRIATE
REQUIREMENTS FOR THE REMEDIATION OF OTHER
CONTAMINATION SOURCES - LIME SETTLING BASINS
INTERIM RESPONSE ACTION

Comment 1: Shell incorporates the same comments regarding the land disposal restrictions and RCRA provisions as it had for the M-1 Settling Basins.

Response: As Shell is aware, guidance in this area is under development. The Army will act consistently with EPA guidance concerning this issue.

Rec'd
29 Dec 89
1:30
step

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 320-8333



Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

December 27, 1989

Mr. Donald Campbell
Deputy Program Manager
Rocky Mountain Arsenal
AMXRM-PM, Bldg. 111
Commerce City, Colorado 80022-2180

Re: State Comments on Proposed Decision Documents for Other Contamination Sources - M-1 Settling Basins and Lime Settling Basins

Dear Mr. Campbell:

Enclosed are the State's comments on the above-referenced documents. In-situ vitrification (ISV) appears to be a good choice for the remediation of the M-1 Settling Basins. It should effectively reduce the toxicity, mobility, and volume of the contaminants and treat the organics and inorganics simultaneously. According to the M-1 Settling Basins Alternative Assessment document, the treatment can be implemented quickly to minimize further contamination of the groundwater.

The Lime Settling Basins may also be suitable for ISV. Although the Army has chosen to cap and build a slurry wall around the Lime Settling Basins as the Interim Response Action (IRA), this will not preclude the use of ISV (or other treatment methods) as the final treatment for these basins. Because ISV is a relatively unproven technology we approve of the Army's cautious approach in using the process at a small site (the M-1 Settling Basins), with the possibility of scaling up to the larger Lime Settling Basins, if shown to be successful.

A major concern not addressed in these Proposed Decision Documents is the arsenic and mercury contamination in the groundwater in the area of the M-1 and Lime Settling Basins. As the State has commented previously, the Army should explore treatment of inorganics in the groundwater prior to the final remedy, at the sources or at the Basin A neck groundwater intercept/treatment system.

Some of the comments being provided at this time are more relevant to the design and implementation stage of the IRAs. The State feels that by submitting these comments at this time, the Army may be better able to utilize them.

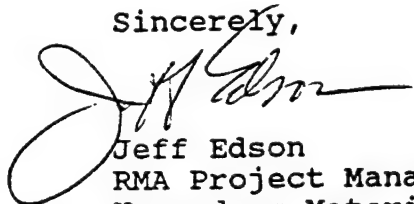
RMA 90-0003 1/2

Mr. Campbell
Rocky Mountain Arsenal
December 27, 1989

Page 2

If you have questions or wish to discuss these issues,
please feel free to call me.

Sincerely,



Jeff Edson
RMA Project Manager
Hazardous Materials and
Waste Management Division

JTE:jmb
C:\WS2000\RMA\CAMPBEL3.LTR

Enclosures

cc: Michael Hope, Esq.
John Moscato, Esq.
Chris Hahn, Shell
Edward J. McGrath, Esq.
Connally Mears, EPA
Bruce Ray, EPA
Major Lawrence E. Rouse
Tony Truschel, GeoTrans

RESPONSE TO COMMENTS FROM THE STATE OF COLORADO
ON THE PROPOSED DECISION DOCUMENT
FOR OTHER CONTAMINATION SOURCES IRA
LIME SETTLING BASINS

GENERAL COMMENTS

Comment 1: In the Final Alternative Assessment of Interim Response Actions for Other Contamination Sources, Lime Settling Basins (Alternative Assessment document), the Army states that Alternative 2, Monitoring, will also be incorporated in any of the remaining Alternatives 3 through 7 selected for the IRA (page 4-2). Therefore, the proposed Alternative (#4) presented in the Decision Document should include alluvial aquifer and ambient air monitoring. Nowhere in the Proposed Decision Document is this stated. We assume that this is an oversight by the Army, and that the Monitoring Program presented in Section 4.1.2 of the Assessment Document will be included as part of the Lime Settling Basins IRA. Monitoring should consist of quarterly sampling of groundwater from upgradient alluvial wells 36001, 36054, 36058 and 36193, and downgradient wells 36076, 36167, and 36194 and analysis for the following target compounds: 1) volatile halogenated organics; 2) volatile aromatic organics; 3) semi-volatile halogenated organics; 4) total and dissolved arsenic; 5) total and dissolved mercury; 6) ICP metals; and 7) pH. The air monitoring program should consist of quarterly sampling from four air monitoring stations to be set up around the perimeter of the slurry wall. Air samples should be analyzed for TSP, metals, pesticides, and semi-volatile organic compounds.

Response: Groundwater monitoring will be included as part of the preferred alternative. The text has been changed to clarify this. The groundwater monitoring program presented in the IRA Alternatives Assessment is a suggested program used for evaluation purposes. Details of the groundwater monitoring program would be determined during the design of this IRA, and the State's recommendations will be taken into consideration at that time.

Additional air monitoring may be implemented during construction operations, if determined to be necessary during design. However, the Army does not anticipate that air monitoring specifically for the Lime Settling Basins area will be necessary following completion of implementation of this interim action, other than the air monitoring conducted under the CMP for the entire Arsenal.

Comment 2: The State requests further assurances by the Army that the multi-layered cap will not become the final remedy (without treatment of the sludge and contaminated soils).

Response: The preferred IRA alternative for this site is construction of a subsurface barrier with cover, and groundwater extraction and treatment, as necessary, to maintain an inward gradient. This alternative is not intended to be the final remedy. Further remedial actions will be evaluated in determining the final remedial action in the Onpost Record of Decision (ROD).

Comment 3: Locations of the three Lime Settling Basins and the proposed slurry wall should be clearly shown with respect to the central section of Site 36-4 presented in Figure 2-1 of the

Alternative Assessment Document. The Army has stated that the slurry wall will be constructed around the three basins and associated berms. Does this correspond to the perimeter of the central section or do the basins and resultant slurry wall only cover a subarea of this section?

Response: For the purpose of the IRA Alternative Assessment, it was assumed that the subsurface barrier would be located approximately 20 feet outside the Lime Settling Basins boundary. The exact location of the barrier will be determined during design. Some of the contaminated material adjacent to the Lime Settling Basins, which appears to be sludge from the basins removed for drying, will also be placed within the subsurface barrier before construction of the soil and vegetative cover.

Comment 4: It appears that an area to the north of the Lime Settling Basins (Phase II expanded Site 36-4) was used for land application and drying of lime sludge (Decision Document, page 2-1). The Army states on page 2-27 of the Alternative Assessment Document that the top 2.5 feet of this sludge/soil will be removed and placed in the central section for subsequent capping. However, review of Figure 36-4-II-1 in the Site 36-4 Phase II Contaminant Assessment Report (CAR) indicates that two of the six Phase II borings, and one of the three Phase I borings in the northern section have high organochlorine pesticide (OCP), arsenic, and mercury concentrations in the 4 to 5 foot interval. This indicates that sludge or sludge soils are present to a depth of five feet, and that excavation of only 2.5 feet of sludge could actually expose soils with higher OCP, arsenic, and mercury concentrations than present in the current topsoil. How does the Army plan to address the 2.5 to 5 foot contaminant interval in the northern section? The State strongly recommends excavation to a depth of five feet in this area.

Response: The depth of 2.5 feet was used for evaluation purposes. The exact depth for excavation will be determined during design, and the State's recommendation will be taken into consideration. The depth of removal will be based on the presence of sludge materials, and the results of field investigations.

Comment 5: The Army also intends to remove the top 1 foot of soils from the western and southern sections of Site 36-4 (Alternative Assessment Document, page 2-27). However, the Army has not indicated that these areas were used for land application of lime sludge. Review of figures 36-4-II-1 (Site 36-4 Phase II CAR) supports the observation that sludge was not applied to these areas, and indicates that the low levels of OCPs present in the 0 to 1 foot interval (maximum concentration of 1 ug/g dieldrin in Boring 3163 of the western section) are possibly due to wind transport of contaminants. Comparison of the low OCP levels in the western and southern sections with the much higher concentrations present in the northern section raises the question of why the Army finds it necessary to excavate topsoils in the former two sections, while not addressing obvious lime sludges present to 5 foot depths in the northern section.

Response: See response to the State's General Comment No. 4.

Comment 6: **The Army should collect sufficient samples of the soils and sludges from the Lime Settling Basins prior to capping, so that lab treatability studies can be performed to allow the selection of the best final remedy.**

Response: **Agreed. This will be considered during design and implementation of this IRA.**

RESPONSE TO COMMENTS FROM THE STATE OF COLORADO
ON DRAFT APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
FOR THE LIME SETTLING BASINS
INTERIM RESPONSE ACTION

GENERAL COMMENTS

Comment 1: The Proposed Decision Document states that lime sludge adjacent to the basins will be moved onto the basins prior to construction of the slurry wall. However, the ARARs contain no standards regarding the excavation and transportation of the hazardous materials. The composition of these materials should be described in the decision document and applicable air emissions and hazardous waste management regulations designated as ARARs.

Response: The proposed Decision Document only mentions that the lime sludge adjacent to the basins will be moved onto the basins. The Health and Safety Plan covers detection and appropriate actions to be taken in case of emissions.

Comment 2: To the extent that this document repeats text contained in previous Army draft ARARs documents without acknowledging prior comments offered by the parties, the State refers the Army to previous State ARARs comments on those documents.

Response: Please see the Army's previous response to the State's comments.

SPECIFIC COMMENTS

Comment 1: P. 8-3, para. 1: The Army writes that it has reviewed all potential ambient or chemical-specific air emissions and found no federal or state ambient air quality standards applicable. However, the lime settling basins soils and groundwater contain VOCs as well as lead and mercury. The Army should therefore list ARARs for the possible emissions from the construction of the slurry wall including Colorado regulations 7 and 8, in addition to standards for removal of lime sludge into the lime basins.

Response: In the context of this IRA, there is only a limited chance of any release of volatiles or semivolatiles, and even if such a release did occur, it would only be intermittent and of very brief duration (because the activity that produced the release would be stopped and modified appropriately if a significant air emission was detected by the contractor's air monitoring specialist). The Army has significant experience with the construction of extraction and reinjection wells, and with the construction of subsurface barriers, such as is included in this IRA, and has not experienced any problems from air emissions during construction of such facilities. The site specific Health and Safety Plan will adequately address these concerns. This plan, to be developed for use in the IRA, will detail operational modifications to be implemented in the event that monitoring detects specific levels of such emissions. The Army has not identified any promulgated standards which address possible emissions from this type of construction activity.

Comment 2: P. 8-3, para. 2: The Army states that construction for lime settling basins IRA does not involve significant excavation with therefore little potential for air emissions during construction. However, the proposed decision document states that the system will include the construction of a slurry wall, which requires excavation. Therefore, the construction clearly has the potential for release of air emissions during construction. The Army should expand its ARARs analysis to include standards for air emissions from the construction of the slurry wall.

Response: The narrow excavation involved in the construction of a subsurface barrier is not likely to result in significant air emissions, since it does not involve exposing large amounts of soil. No promulgated standards were identified which address possible emissions from this type of construction activity.

Comment 3: P. 8-3, para. 3: The Army states that National Emissions Standards for Hazardous Air Pollutants (NESHAPS) were not considered relevant and appropriate in the context of this IRA because the standards were developed for manufacturing processes which are significantly dissimilar to the short-term construction activities. The Army, however, should consider NESHAPS relevant and appropriate if the contaminants subject to NESHAPS are emitted in quantities mandated by the regulation and at the minimum meet these standards.

Response: NESHAPS are process specific and are not considered relevant and appropriate to apply to any treatment system unless such system is similar to the specific process for which that standard was developed.

Comment 4: P. 8-3, para. 4: The Army states that the provisions of 40 C.F.R. § 50.06 are considered relevant and appropriate. However, the Army must also consider Colorado Regulation 1, which includes all total suspended particulates (TSP) and it (sic) therefore stricter than the federal standard. The Army has also misstated the federal standard. The correct federal standard is that the particulate matter must not exceed 50 micrograms per cubic meter, not 75, as the Army states. The federal standard also lists particulate emission for a 24 hour average at 150 micrograms per cubic meter.

Response: Fugitive particulate emissions requirements of Colorado Regulation 1 were considered. The Army recognizes this requirement and will use all available and practical technology to minimize such emissions. This section has been revised to reflect the current standard in 40 CFR part 50.6. The document also includes the State's specific standard in Regulation No. 1 for construction activity.

Comment 5: P. 8-8, para. 2: The Army lists a number of RCRA provisions it considers applicable to the management of hazardous wastes. Under CHWMA, a number of other regulations are relevant such as 6 CCR 1007-3 pt. 264.

Response: The Final Decision Document includes reference to State regulations.